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Department of Environmental Quality
State Air Program

MEMORANDUM

TO: HARBI ELSHAFEI

FROM: MELISSA ARMER, JBR ENVIRONMENTAL CONSULTANTS, INC.

SUBJECT: SUMMIT SEED COATINGS- BAGHOUSE GRAINLOADING CALCULATIONS

DATE: 3/19/2008

Particulate emissions from the new Carbotech® pulse baghouse were calculated utilizing two separate methods which resulted in similar overall emissions. The higher of the two emission calculation methods was conservatively used to demonstrate compliance with ambient air quality standard for PM_{10} and particulate TAPs.

The first calculation method is based on a mass balance and utilizes a 99.9% baghouse collection efficiency and seed coating transfer efficiency of 95%. Modeling was originally conducted utilizing the results of this calculation method and demonstrated compliance with ambient air quality standards. Based on process knowledge Summit was confident that this calculation method conservatively estimated maximum emissions from the new coating line. After meeting with IDEQ it was recommended that the filter bag grainloading be utilized to calculate emissions from the new baghouse rather than process knowledge.

A second calculation method was utilized to conservatively estimate the maximum potential emissions from the new baghouse. The second calculation method is based on the maximum air flow rate through the baghouse and the grainloading of the filter bags. The maximum actual air flow rate through the baghouse is 75,000 cfm. The calculated dry standard air flow rate is 63,052 DSCFM.

The filter bag manufacturer, Southern Felt Company provided documentation which shows the actual grainloading for the polyester filter bags have a grainloading of 0.0001153 gr/dscf. The grainloading documentation is located in Appendix A and is based on emission test results utilizing ASTM D6830-02 Standard Test Method for Characterizing the Pressure Drop and Filtration Performance of Cleanable Filter Media. This test method determines the performance of filter media and the results can be used for design and selection of filter media. Although the results obtained by this test method may not predict absolute performance, Southern Felt Company believes the results are representative for Summit's operation.

Utilizing the dry standard air flow rate of 63,052 DSCFM and the grainloading of 0.0001153 gr/dscf results in a PM_{10} emission rate equal to 0.062 lb/hr. This value is an order of magnitude lower than the emission rate calculated utilizing the first calculation method (PM_{10}= 0.469 lb/hr).

As a conservative effort to calculate the maximum potential emissions from the baghouse Summit utilized the actual maximum air flow rate of 75,000 cfm to calculate maximum emissions rather than the lower dry standard air flow rate (63,052 DSCFM) which would result in lower emissions.

In addition, since the filter bag grainloading is based on ASTM D6830-02 test results and does not predict absolute performance, Summit conservatively assumed a higher grain loading to account for actual operating conditions that may differ from the test conditions. Also, Summit would like the flexibility to

utilize filter bags provided by a different manufacturer which may not be able to provide a grainloading guarantee as low as the 0.0001153 gr/dscf

Since modeling was conducted at the higher emission rate and demonstrated compliance with ambient air quality standards Summit elected to request permit limits that demonstrated compliance with ambient air quality standards and also allowed for operational flexibility. Total PM_{10} emissions modeled from the new baghouse consist of both process particulate and combustion emissions from the FBD. PM_{10}= 0.469 lb/hr from process + 0.0585 lb/hr FBD combustion = 0.528 lb/hr PM_{10}. The requested grainloading permit limit of 0.00073 gr/dscf was conservatively selected to allow for flexibility to utilize filter bags provided by different manufacturers while still demonstrating compliance with ambient air quality standards. The 75,000 cfm air flow rate is the maximum design air flow rate provided by the manufacturer.

APPENDIX A

FILTER BAG DOCUMENTATION
EMISSION CALCULATIONS

new Bag
$ 13.45

ATTN
Stu Barclay
208-455-8040

ETS CONTRACT NUMBER: 02-934 DATE 10/28/02

RUN ID.	934-1-1	934-2-1	934-3-1	934-4-1	934-10-1
FABRIC DESIGNATION	Polyester	Polyester / P84	MicroFelt / PE	CAC / Polyester	CTF / Polyester
MANUFACTURER	Southern Felt	Southern Felt	Southern Felt	Southern Felt	Southern Felt
DUST FEED	Pural NF	Pural NF	Pural NF	Pural NF	Pural NF
VERIFICATION TEST RESULTS	ASTM D6830-02				
Mean Outlet Particle Conc. PM 2.5 (gr/dscf)	0.0001146	0.0000800	0.0000376	0.0000745	0.0002105
Mean Outlet Particle Conc. Total mass (gr/dscf)	0.0001153	0.0000800	0.0000376	0.0000759	0.0002187
Initial Residual Pressure Drop (in. w.g.)	1.48	1.44	1.76	3.11	2.18
Change in Residual Pressure Drop (in. w.g.)	0.42	0.50	0.23	1.91	1.48
Average Residual Pressure Drop (in. w.g.)	1.74	1.75	1.90	4.34	3.08
Mass Gain of Filter Sample (g)	1.43	2.08	0.74	0.68	1.37
Average Filtration Cycle Time (s)	48	49	89	6	7
Number of Pulses	448	445	241	3599	3157
RESIDUAL PRESSURE DROP At Start of:					
Conditioning Period (in. w.g.)	0.05	0.06	0.12	0.08	0.04
Recovery Period (in. w.g.)	1.39	1.30	1.72	3.13	2.19
Performance Test Period (in. w.g.)	1.48	1.44	1.76	3.11	2.18
REMOVAL EFFICIENCY (%)					
Dust Conc (gr/dscf)	8.17	7.73	7.39	7.43	6.99
PM 2.5 *	99.99819	99.99856	99.99934	99.99870	99.99811
Total Mass **	99.99859	99.99897	99.99949	99.99898	99.99890

* (Dust Concentration * 0.7735) - PM 2.5 Outlet Concentration * 100
Dust Concentration * 0.7735

PARTICULATE EMISSIONS - NEW BAGHOUSE- SUMMIT SEED COATING

Table 1: Method One- Mass Balance

Description	Byproduct Captured (lb/hr)[a]	Control Factor (%)	Control Factor Reference	PM-10 Emissions (lb/hr)	PM-10 Emissions (T/yr)
Carbo-Tech Baghouse	469.5	99.9	Manf. Guarantee - Carbotech, 12/24/07 email	0.469	2.06
			TOTAL =	**0.469**	**2.06**

[a]From mass balance- maximum rate of material processed is 9390 lb/hr limestone and assuming conservative 95% coating transfer efficiency.

Table 2: Method Two- Grainloading

Description	Air Flow Rate (acfm)	Air Flow Rate (dscfm)	Emission Guarantee (gr/dscf)[b]	Control Factor Reference	PM-10 Emissions (lb/hr)	PM-10 Emissions (T/yr)
Carbo-Tech Baghouse-Southern Felt Filters	75,000	63,052	0.00073	Southern Felt Company filter bag guarantee	0.469	2.06
				TOTAL =	**0.469**	**2.06**

[b] DSCFM = ACFM x $\frac{(460\ ^\circ R + 70\ ^\circ F)}{(460\ ^\circ R + \text{temp}\ (120\ ^\circ F))}$ x $\frac{\text{actual P (assume 14.7 psi)}}{14.7\ \text{psi}}$ x (1- 8% moisture)

[c]Southern Felt Company documentation provides a guarantee of 0.0001153 gr/dscf however as a conservative estimate 99.9% control with a max of 0.00073 gr/dscf was used for emission calculations along with max actual air flow rate of 75,000 acfm.
(75,000 cfm) x (0.00073 gr/cf) x (60 min/hr) x (1÷7000 gr/lb) = 0.469 lb/hr

Table 3: FUGITIVE PARTICULATE EMISSIONS - PAVED ROADS- SUMMIT SEED COATING

Description	Particle Size Multiplier k1 (lb/VMT)	Silt Loading (g/m^2)[b]	Average Vehicle Weight (tons)	Number of Day in Avg. Period (N)	Number of Days with 0.01 in Precip. (P)	Emission Factor (lb/VMT)	VMT/yr	Emissions (tpy)	Emissions (lb/hr)
Trucks	0.016	12	10	365	90	0.293	206	0.030	0.007
							TOTAL =	**0.030**	**0.007**

[a] EF PM10= $[k1(sL/2)^{0.65} * (W/3)^{1.5}] * (1-P/4N)$

[b] Table 13.2.1-4, AP-42 Recommended silt loading for concrete batching.